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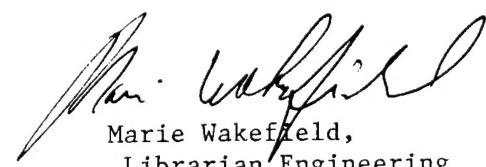


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FINAL REPORT
EXECUTIVE SUMMARY
INCREMENT A AND B STUDY
AT
ABERDEEN PROVING GROUNDS, MARYLAND

Prepared for:

Department of the Army
Norfolk District, Corps of Engineers
Norfolk, Virginia 23510

Under Contract No. DACA-65-84-C-0105

March 1988

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Project Manager

ROY F. WESTON, INC.
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West Chester, Pennsylvania 19380

W.O. #0335-72-01/02

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SECTION 1

EXECUTIVE SUMMARY

1.1 INTRODUCTION

This report presents the results of the Energy Engineering Analysis Program conducted by Roy F. Weston, Inc. at the Aberdeen and Edgewood Areas of Aberdeen Proving Grounds under Contract No. DACA-65-84-C-0105. The study includes identification and evaluation of specific energy conservation opportunities that are applicable to the 44 buildings at Aberdeen and Edgewood.

The Increments of Work to be provided as stated in the Scope of Work:

Increment A - Projects involving modifying, improving or retrofitting existing buildings to make them more energy efficient.

Increment B - Energy conservation investigations of utilities and energy distribution systems, and energy monitoring and control systems (EMCS).

The study involved field surveying the various buildings to find out the present operating conditions and schedules, and to identify energy conservation opportunities that may be applicable. Detailed calculations were performed to evaluate the opportunities and package them into QRIP/PECIP projects.

1.2 HISTORICAL ENERGY CONSUMPTION

The annual fuel consumption at Aberdeen and Edgewood for FY 1985 (October 1984 to September 1985) was:

- Annual Electric Consumption at Aberdeen - 86,823,988 kWh
- Annual Electric Consumption at Edgewood - 60,406,319 kWh
- Total Electric Consumption at Base - 147,230,307 kWh
- Annual Fuel Oil Consumption at Aberdeen - 5,284,904 Gallons
- Annual Fuel Oil Consumption at Edgewood - 7,649,696 Gallons

- Total Fuel Oil Consumption at Base - 12,934,600 Gallons

The average fuel oil cost for FY 1985 was 0.95 per gallon.

The latest electric consumption and cost data available for the Aberdeen and Edgewood areas is for the year beginning in October of 1984 and continuing through September of 1985. Electricity is supplied to the base by four utility companies - Baltimore Gas and Electric Company, Delmarva Power Company, Conowingo Power Company and Choptank Electric Cooperative, Inc. In FY 1985 a total of 147,230,307 kWh of electricity was consumed at Aberdeen and Edgewood, costing \$7,398,316.22. This results in an average electric cost of \$0.05/kWh which was used in this report.

For FY 1984 (October 1983 to September 1984) the total consumption of fuel oil and electricity was:

- Annual Electric Consumption at Aberdeen - 82,884,291 kWh
- Annual Electric Consumption at Edgewood - 58,579,513 kWh
- Total Electric Consumption at Base - 141,463,804 kWh
- Annual Fuel Oil Consumption at Aberdeen - 6,319,126 Gallons
- Annual Fuel Oil Consumption at Edgewood - 8,953,330 Gallons
- Total Fuel Oil Consumption at Base - 15,272,456 Gallons

Fuel oil consumption for FY 1985 was 18.1% lower than for FY 1984 and electric consumption for FY 1985 was 4.1% higher than for FY 1984.

In comparison fuel oil consumption for FY 1984 was 10.76% higher than for FY 1983 and electric consumption was up 6.59% over FY 1983.

1.3 SPECIAL INSTRUCTIONS

Since the scope of work was written for a base-wide study and this study includes only a few buildings at the base, some items were deleted from the scope of work. This includes:

- (i) Paragraph 2.5 Future Population
- (ii) Paragraph 6.2.4 Information on Meters
- (iii) Paragraph 6.3.1 Distribution Systems
- (iv) Paragraph 6.3.4 EMCS Study, which was deleted from the scope of work by the post.

It was established that three buildings will be computer modelled, using the Carrier E20-II program. These are buildings 2353, E1930 and E5185, which have the highest annual energy savings.

The "expected lives" of the buildings used for the life cycle cost analysis were obtained from the Building Information Schedules (BIS) and verified by the post.

1.4 FINDINGS

The work done was performed in two phases. The first phase involved site visits and data collection on the various buildings. The data collected included drawings and building information schedule (BIS). Site visits were performed to collect information on cooling and heating equipment, lighting type, lighting levels, operating schedules and function of the building. Conversations and interviews were conducted with the building administrators to gain an insight into the operation of the building and to help in identifying energy conservation opportunities (ECO's). All information collected was used to identify the various ECO's applicable. The second phase involved evaluation of the various energy conservation opportunities and life cycle cost analysis.

A list of Energy Conservation Opportunities (ECO's) to be investigated is contained in Table 1-1. This list along with previous energy conservation retrofit experience, and observations and data obtained from site visits provided a basis for a list of ECO's to be quantitatively analyzed. The opportunities involved are:

- Wall Insulation
- Window Weatherization
- Weatherstripping
- Upgrading EMCS
- Infrared Heaters
- Destratification
- Return Condensate
- Reduce Lighting Levels
- High Efficiency Lighting

- Improve Power Factor
- Revise/Repair HVAC Controls
- Low Leakage Rolling Doors
- Light Motion Sensors
- Centralized Chiller Plant
- Expand EMCS to Include Night Setback

After analysis of the above ECO's, life cycle cost analysis was performed to calculate their SIR values. Tables 1.2 and 1.3 summarize the results of the ECO's evaluated for the Aberdeen and Edgewood areas. Projects having SIR value less than 1.2 are not recommended per directions from the post. The tables show the total savings for projects having SIR greater than 1 and 1.2.

WESTON
COMPAÑIA
INDUSTRIAL

ENERGY CONSERVATION OPPORTUNITIES

Building Envelope

- Wall Insulation
- Root/Ceiling Insulation
- Storm Windows/Double Glazing
- Reduce Glass Area
- Weatherstripping
- Insulation Panels
- Solar Films

Legend

- Retrofit to be Investigated by WESTON
- ▲ Retrofit Implemented or Being Implemented by Post
- Retrofit Investigated by WESTON for Boiler Plant/Chiller Plant Study
- △ Retrofit Investigated by JRB Assoc.
- E Current ECIP Project

Location: Aberdeen Proving Grounds,
Edgewood Area

TABLE 1.1 ENERGY CONSERVATION OPPORTUNITIES MATRIX

ENERGY CONSERVATION OPPORTUNITIES		Misc.	Lighting and Electrical	Air-Conditioning	Building No.	Remarks
•	Retrofit to be Investigated by WESTON				E1930	
▲	Retrofit Implemented by Post				E2100	
■	Retrofit Investigated by WESTON for Boiler Plant/Chiller Plant Study				E2101	
△	Retrofit Investigated by JRB Assoc.				E3081	● ▲
E	Current ECIP Project				E3100	●
Centralized CHW Plant					E3160	●
Conversion to VAV System					E3220	●
OCU/Unoc Control					E3222	
Duty Cycling					E3226	●
Demand Limiting					E3244	
Economizer Cycle					E3300	
High Efficiency Lighting Level					E3550	
FM Radio Power Factor					E3580	
Rep. Ineff. Kitchen Light					E3725	
Optimize Transformer Loss					E3728	
Revise Transformer Loss					E5100	●
EMCS						
Heat Recovery-Cooling						
Thermal Exhaust System						
Improve Barriers for Food Cases						
Sentry Station						
Being Renovated						

Location: Aberdeen Proving Grounds,
Edgewood Area

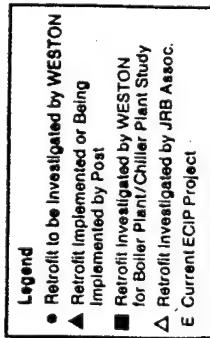


TABLE 1.1.1 (CONTINUED)

WESTON
COPPIA LINEA

ENERGY CONSERVATION OPPORTUNITIES

Building Envelope

Legend

- Retrofit to be Investigated by WESTON
- ▲ Retrofit Implemented or Being Implemented by Post!
- Retrofit Investigated by WESTON for Boiler Plant/Chiller Plant Study
- △ Retrofit Investigated by JRB Assoc.
- E Current ECIP Project

Location: Aberdeen Proving Grounds,
Edgewood Area

TABLE 1.1 (CONTINUED)

WESTON
COMPA. MEX.

ENERGY CONSERVATION OPPORTUNITIES

ENERGY CONSERVATION OPPORTUNITIES		Building No.	Remarks
Misc.	Air-Conditioning		
Centralized CHW Plant	Converter to VAV System	E5106	
DCC/Unoc. Control	Duty Cycling	E5185	▲
Programmed Start/Stop	Economizer Limiting	E5234	▲
Demanded Limiting	Heat Recovery Cycle	E5265	△
High Efficiency Lighting	Reduce Lighting Level	E5452	●
Fm Improve Energy Motor	FM Radio Power Factor	E5625	●
Optimize Kitchen Light	Revisit Kitchen Light	E5695	●
Radio Frequency Controls	Revise Transformer Ldg.		
Refrigeration Controls	Optimize Transformer Ldg.		
Refrigerant Recovery-Commissary	Heat Recover Street Light		
Thermal Barriers for Food Cases	Improve Exhaust System		

TABLE 1.1 (CONTINUED)

Location: Aberdeen Proving Grounds,
Edgewood Area

Legend

- Retrofit to be Investigated by WESTON
- ▲ Retrofit Implemented or Being Implemented by Post
- Retrofit Investigated by WESTON for Boiler Plant/Chiller Plant Study
- △ Retrofit Investigated by JRB Assoc.
- E Current E&C Project

ENERGY CONSERVATION OPPORTUNITIES		Building No.	Remarks													
Building Envelope	Heating															
Roof/Ceiling Insulation	Shut-down Hot Water Restrictor	120	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Storm Windows/Insulation	DHW Heat Pumps	309	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Wall Insulation	Revised Trim Controls	316	E	●	●	●	●	●	●	●	●	●	●	●	●	●
Roof/Ceiling Insulation	Bottle Trim Controls	321	△	●	●	●	●	●	●	●	●	●	●	●	●	●
Windbreaks/Doublle Glazing	Revised Boiler Controls	328	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Weatherstripping/Panels	Revised Steam Lines	390	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Vestibules	Revised Condensate	393	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Low Leakage Roofs	DHW Heater	394	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Air Curtains	Revised Steam Lines	400	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Plastic Strip Doors	Revised Boiler Controls	436	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Radial Control Circuits	Revised Condensate	670	●	●	●	●	●	●	●	●	●	●	●	●	●	●
High-Res Heat Traps	Revised Steam Lines	699	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Infrared Sensors/TIME Clocks	Revised Condensate	700	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Desctratilization Heaters	Revised Steam Lines	745	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Inter-Res Back/Time Clocks	Revised Condensate	2353	△	●	●	●	●	●	●	●	●	●	●	●	●	●
Decentralized Controls	Revised Steam Lines	2501	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Location: Aberdeen Proving Grounds,
Aberdeen Area

- Legend
 - Retrill Implemented or Being Investigated by WESTON
 - ▲ Retrill Implemented by Post
 - Retrill Investigated by WESTON for Boiler Plant/Chiller Plant Study
 - △ Retrill Investigated by JRB Assoc.
 - E Current ECI Project

Table 1.1 ENERGY CONSERVATION OPPORTUNITIES MATRIX

ENERGY CONSERVATION OPPORTUNITIES		Building No.	Remarks															
Category	Opportunity Description			120	309	316	321	328	390	393	394	400	436	670	699	700	745	2353
All-Conditioning	Centralized CHW Plant	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Programmed Start/Stop	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Duty Cycling	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Economizer Limiting	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Heat Recclaim From Hot Water	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	High Efficiency Lighting	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Reduce Lighting Level	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	High Efficiency Motor	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	FM Radio Control	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Optimize Kitchens Light	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Reduce Street Lamp	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	EMCS	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Heat Recovery-Commissary	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Thermal Exhaust System	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Improve Barriers for Food Cases	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Misc.																		

Legend

- Retrofit Implemented or Being Implemented by Post
- ▲ Retrofit Investigated by WESTON for Boiler Plant/Chiller Plant Study
- Retrofit Investigated by JRB Assoc.
- △ Current ECIP Project

Location: Aberdeen Proving Grounds,
Aberdeen Area

Table 1.1 (CONTINUED)

ENERGY CONSERVATION OPPORTUNITIES

Table 1.1 (CONTINUED)

ENERGY CONSERVATION OPPORTUNITIES		Misc.	Remarks												
Air-Conditioning	Lighting and Electrical														
Centralized CHW Plant	Convert to VAV System			●	●	●	●	●	●	●	●	●	●	●	●
Duct/Unoc. Control	Programmed Start/Stop			●	●	●	●	●	●	●	●	●	●	●	●
Duty Cycling	Economic Limiting			●	●	●	●	●	●	●	●	●	●	●	●
Heat Recovery Cycle	Reduce Light from Hot Gases			●	●	●	●	●	●	●	●	●	●	●	●
High Efficiency Lighting	High Efficiency Lighting Level			●	●	●	●	●	●	●	●	●	●	●	●
FM Radio Power Factor	Optimize Kitchen Light			●	●	●	●	●	●	●	●	●	●	●	●
FM Radios	Revise/Replace HVAC Controls			●	●	●	●	●	●	●	●	●	●	●	●
Optimize Street Light	Heat Recovery-Compressor			●	●	●	●	●	●	●	●	●	●	●	●
Revise Street Light	Thermal Barriers for Food Cases			●	●	●	●	●	●	●	●	●	●	●	●
EMCS	Improve Exhaust System			●	●	●	●	●	●	●	●	●	●	●	●
EMCs	Heat Recovery-Compressor			●	●	●	●	●	●	●	●	●	●	●	●
EMC	Improve Exhaust System			●	●	●	●	●	●	●	●	●	●	●	●
EMC	Thermal Barriers for Food Cases			●	●	●	●	●	●	●	●	●	●	●	●

Legend

- Retrofit Implemented or Being Investigated by WESTON
- ▲ Retrofit Implemented by Post
- Retrofit Investigated by WESTON for Boiler Plant/Chiller Plant Study
- △ Retrofit Investigated by JBB Assoc.
- E Current ECIP Project

Location: Aberdeen Proving Grounds,
Aberdeen Area

Building No.
4024
4025
5043
5220
5221

Table 1.1 (CONTINUED)

TABLE 1-2

SUMMARY OF EVALUATED ECO'S - ABERDEEN AREA

<u>Opportunity</u>	<u>Annual Energy Savings</u>			<u>Annual Non-Energy Cost (\$)</u>	<u>Unescalated Current Working Estimate (\$)</u>	<u>Simple Payback (Yrs)</u>	<u>SIR</u>
	<u>Electricity (MBTU)</u>	<u>Fuel Oil Total (MMBTU)</u>	<u>Total (MMBTU)</u>				
ECO 2.1: Install Light Motion Sensors in Building 393	1,039.44	----	1,039.44	4,480	10,600	2.4	2.7
ECO 2.2: Install Thermostat and Control Valve in Bldg. 670	----	124.4	124.4	860	484	0.56	12.7
ECO 2.4: Window Weatherization (#436,670)	265.50	265.50	265.50	1,835	8,457	4.60	1.23
ECO 2.5: Insulated Low Leakage Rolling Doors	----	----	----	----	----	----	----
15 x 18 Door	----	45.75	45.75	316	9,693	30.70	0.23
(2) 10 x 12 Door	----	38.26	38.26	264	8,220	31.10	0.11
ECO 2.6: Infrared eaters	----	----	----	----	----	----	----
					(No cost savings even though there is energy savings.)		

TABLE 1-2 (CONTINUED)

SUMMARY OF EVALUATED ECO'S - ABERDEEN AREA

<u>Opportunity</u>	<u>Annual Energy Savings</u>		<u>Non-Energy Cost Savings (\$)</u>	<u>Unescalated Current Working Estimate (\$)</u>		<u>Simple Payback (Yrs)</u>	<u>SIR</u>
	<u>Electricity</u> <u>(MBTU)</u>	<u>Fuel Oil Total (MBTU)</u>		<u>3,470</u>	<u>8,214</u>	<u>2.40</u>	
ECO 2.7: Decentralization of High Bay Areas							
Building 2353:	-65.2	542.90	477.70	3,470	8,214	2.40	2.98
Building 5943:	-214.1	635.10	421.00	3,467	23,770	6.90	1.01
Building 5220:	-46.6	210.20	163.60	1,250	5,867	4.70	2.37
Building 5221:	-46.6	210.20	163.60	1,250	5,867	4.70	2.37
ECO 2.9: Centralized Chiller Plant (Building 120)	531.5	----	531.50	2,290	80,000	34.90	---
ECO 2.10: Reduced Lighting Levels							
Building 5220:	6.03	----	6.03	26	54	2.10	4.35
Office No. 1	6.03	----	6.03	26	54	2.10	4.35
Office No. 2	6.03	----	6.03	26	54	2.10	4.35
Building 5221:	6.03	----	6.03	26	54	2.10	4.35
Office No. 1	6.03	----	6.03	26	54	2.10	4.35
Office No. 2	6.03	----	6.03	26	54	2.10	4.35

TABLE I-2 (CONTINUED)
SUMMARY OF EVALUATED ECO'S - ABERDEEN AREA

<u>Opportunity</u>	<u>Annual Energy Savings</u>		<u>Annual Non-Energy Cost Savings (\$)</u>	<u>Unescalated Current Working Estimate (\$)</u>		<u>Simple Payback (Yrs)</u>	<u>SIR</u>
	<u>Electricity</u> <u>(MBTU)</u>	<u>Fuel Oil Total (MBTU)</u>		<u>Current Working Estimate (\$)</u>	<u>Simple Payback (Yrs)</u>		
ICO 2.11: Replace Incandescent with Fluorescent Lighting	71.70	----	71.70	744	1,031	1.40	1.88
ICO 2.12: Replace fluorescent with energy-saving Fluorescent	388.70	----	388.70	1,675	932	0.56	4.91
ICO 2.13: Replace incandescent with HPS lighting	65.63	----	65.63	283	1,630	5.8	5.4
Building 699	65.63	----	65.63	222	2,685	12.1	0.7
Building 700	51.53	----	51.53	222	9,782	4.2	4.37
Building 2353	535.64	----	535.64	2,309			
ICO 2.14: Upgrade HVAC Controls in Building 393	----	78.0	78.0	539	399	0.74	9.65
ICO 2.15: Expand EMCS o Include Night Setback	-----	-----	-----	-----	-----	-----	-----
Building 394	-----	1,428.35	1,428.35	9,870	3,200	0.33	34.30
Building 4025	-----	244.56	244.56	1,552	3,970	2.60	4.15
Totals (SIR>1.2)	2,020.84	3,104.10	5,124.94	30,221	-----	-----	-----
Totals (SIR>1)	1,806.74	3,739.20	5,145.94	33,688	60,649	84,419	

TABLE 1-3
SUMMARY OF ECO'S EVALUATED - EDGEWOOD AREA

<u>Opportunity</u>	<u>Annual Energy Savings</u>		<u>Unescalated</u>		<u>SIR</u>
	<u>Electricity</u> <u>(MBTU)</u>	<u>Fuel Oil</u> <u>Total</u> <u>(MBTU)</u>	<u>Annual</u> <u>Savings</u> <u>(\$)</u>	<u>Current</u> <u>Working</u> <u>Estimate</u> <u>(\$)</u>	
ECO 2.1: Wall Insulation					
Applied to Plastic Wall (Building E1930)	----	241.50	241.50	1,669	3,139 1.90 8.82
Applied to Clay Tile Wall (Building E1930)	----	227.90	227.90	1,575	13,526 8.60 1.93
ECO 2.2: Window Weatherization	----	1,924.40	1,924.40	13,298	61,747 4.60 1.22
ECO 2.5: Replace incandescent with Fluorescent Lighting	19.8	----	19.80	205	285 1.40 1.87
ECO 2.8: Destratification of High Bay Areas	-31.1	300.80	269.70	1,944	3,520 1.80 6.17
*ECO 2.10: Condensate Return	-338.7	13,412.40	13,073.70	91,220	714,000 7.80 2.10
ECO 2.12: Reduced Lighting Levels	71.7	----	71.70	309	518 1.70 7.02
Total (SIR>1.2 or SIR>1)	-278.3	16,107.00	15,828.70	110,220	796,735

Note 1: This ECO was evaluated in an earlier study by JRB Associates. WESTON has updated numbers to utilize existing fuel costs.

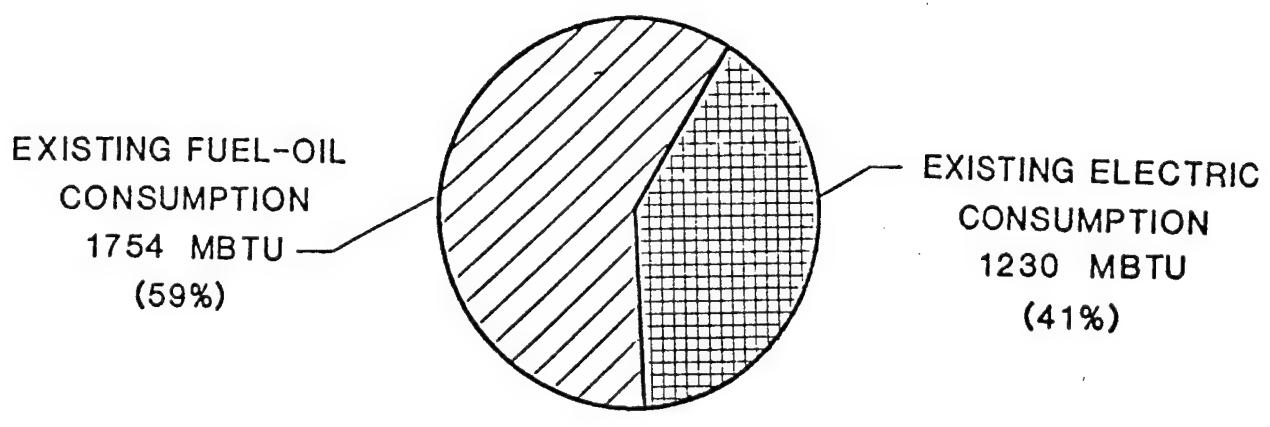
Three buildings were modelled using the Carrier E20-II operating Cost Analysis program to predict the existing annual operating costs of the buildings HVAC and non-HVAC energy consuming systems.

Comparing this with the annual energy savings per building, gives the percent energy savings for each building. The results are summarized below:

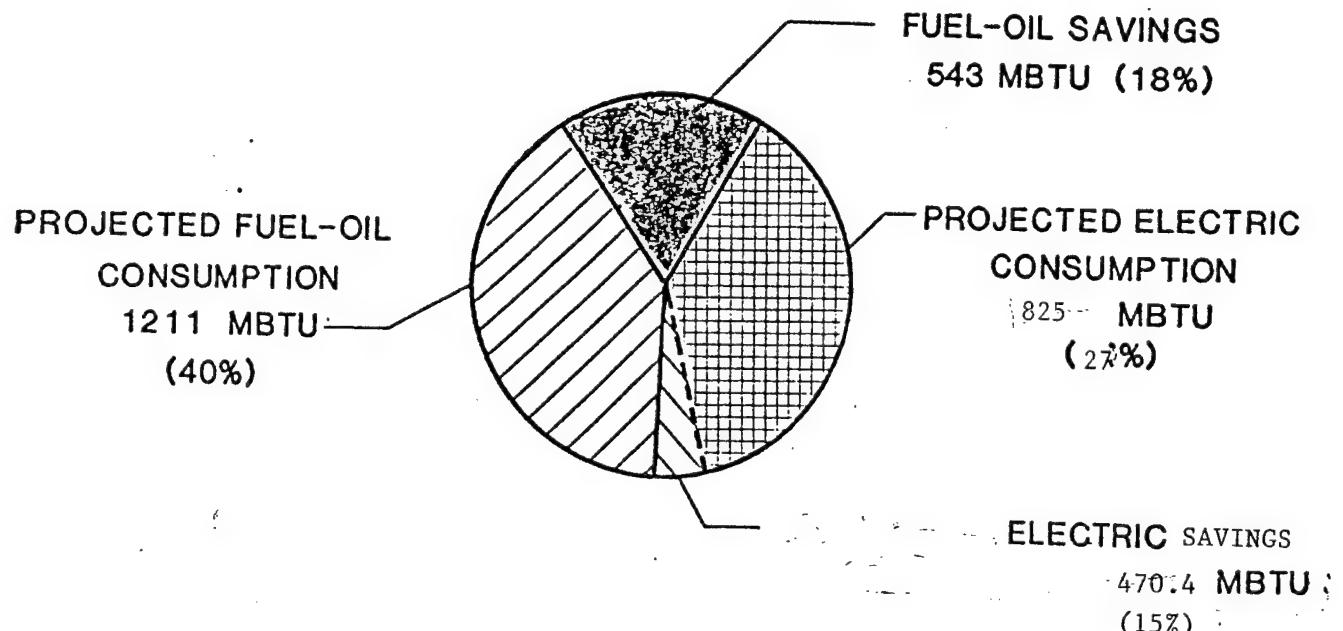
<u>Bldg. No.</u>	<u>Total Savings</u>		<u>Annual Operating Cost (\$)</u>	<u>Percent Cost Savings (%)</u>
	<u>Energy (MBTU)</u>	<u>Cost (\$)</u>		
2353	1013.3	5,779	17,417	33.2
E1930	739.1	5,188	109,229	4.7
E5185	1,924.4	13,298	83,662	15.9

Figures 1-1 through 1-3 present the existing and projected annual energy consumption for Buildings 2353, E1930 and E5185. The existing consumption figures show the percent energy used for electricity and fuel-oil. The projected consumption shows the future fuel-oil and electric consumption and savings if the recommended ECO's for that building are implemented.

FIGURE 1-1
EXISTING AND PROJECTED ANNUAL ENERGY
CONSUMPTION FOR BUILDING 2353
(BASE = FY 1985)

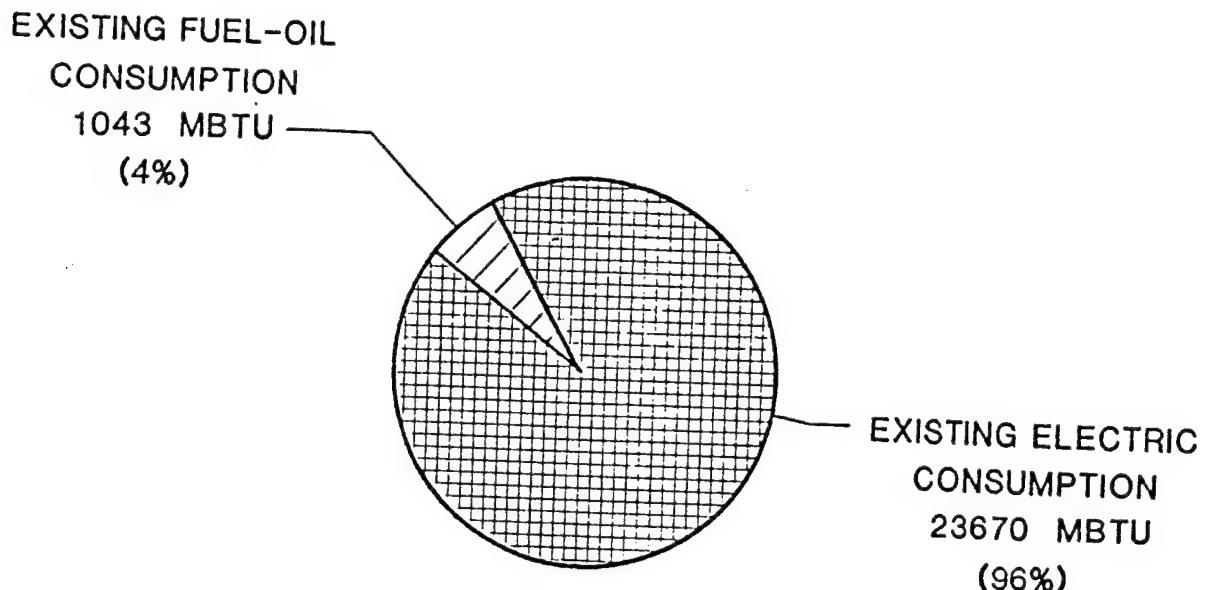


A. EXISTING

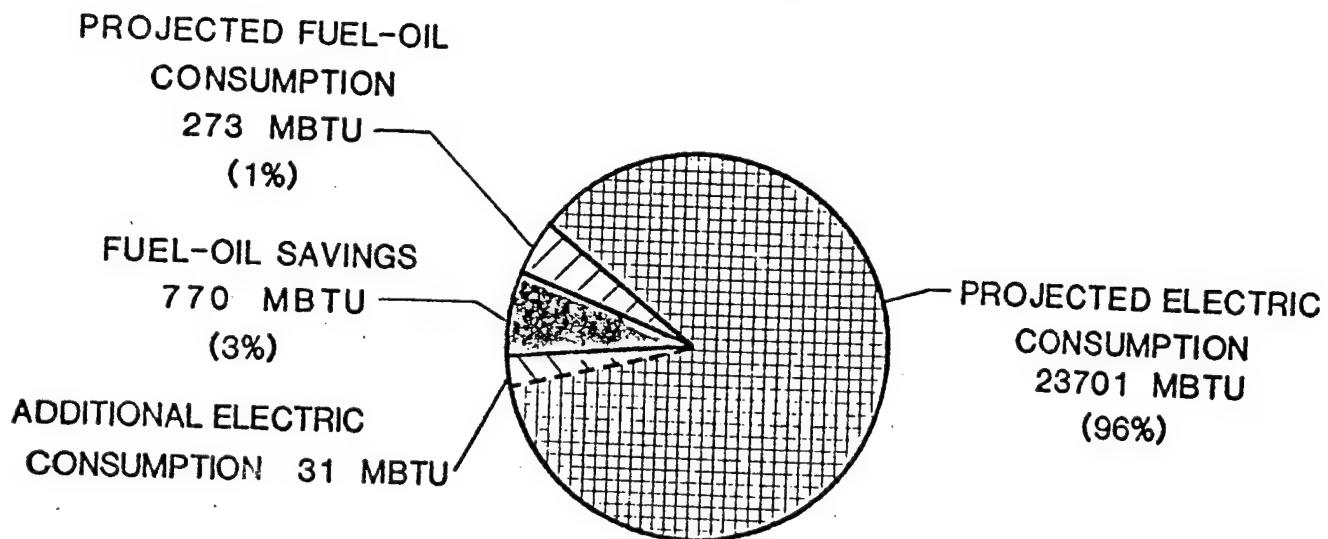


B. PROJECTED

FIGURE 1-2
**EXISTING AND PROJECTED ANNUAL ENERGY
CONSUMPTION FOR BUILDING E1930**
(BASE = FY 1985)

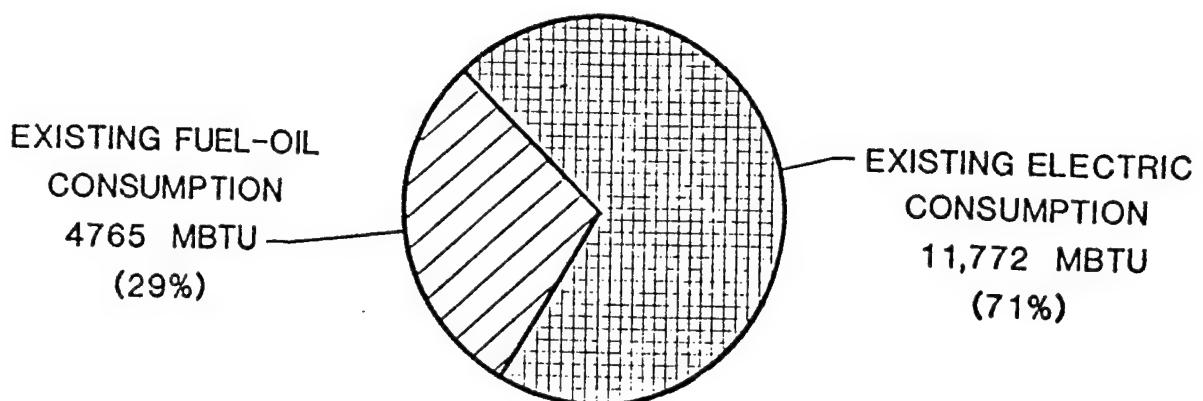


A. EXISTING

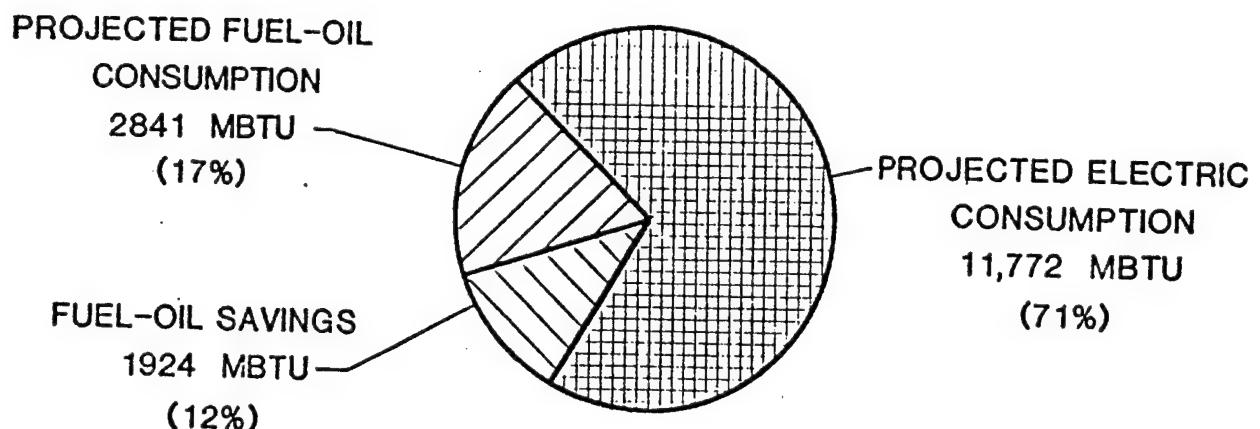


B. PROJECTED

FIGURE 1-3
EXISTING AND PROJECTED ANNUAL ENERGY
CONSUMPTION FOR BUILDING E5185
(BASE = FY 1985)



A. EXISTING



B. PROJECTED

1.5 RECOMMENDED PROJECTS

Projects having SIR greater than 1.2 are grouped into one QRIP project, one PECIP project and one locally funded project. Two projects not included in the documentations are night setback and condensate return. Both these projects were documented as ECIP projects in an earlier study.

The projects recommended are:

PECIP Project #1: Miscellaneous building envelope and controls projects.

QRIP Project #1: Miscellaneous lighting projects.

Locally Funded Project: Wall insulation (Clay wall) - Building E1930

Table 1-4 through 1-6 summarize the PECIP, QRIP and locally funded projects. The total savings resulting from the various projects are:

- Total Annual Energy Savings = 1742.54 MBTU Electricity and 19211.1 MBTU Fuel-Oil
- Total Investment Required = \$857,384
- Total Annual Savings = \$140,441
- Simple Payback Period = 6.1 years.

TABLE 1-4

PECIP PROJECT 1: MISCELLANEOUS BUILDING ENVELOPE AND CONTROL PROJECTS

<u>Opportunity</u>	<u>Electricity Fuel Oil (MBTU)</u>	<u>Annual Energy Savings Total (MBTU)</u>	<u>Annual Savings (\$)</u>	<u>Unescalated</u>		
				<u>Current Working Estimate (\$)</u>	<u>Simple Payback (Yrs)</u>	<u>SIR</u>
Window Weatherization						
- Aberdeen (ECO 2.4)	----	265.4	265.5	1,835	1.23	
- Edgewood (ECO 2.2)	----	1,924.4	1,924.4	13,298	61,747	1.22
Destratification:						
- Aberdeen (ECO 2.7)	-65.2	542.9	477.7	3,470	8,214	2.4
Bldg. 2353	-46.6	210.2	163.6	1,250	5,867	2.37
Bldg. 5220	-46.6	210.2	163.6	1,250	5,867	2.37
Bldg. 5221	-46.6	300.8	269.7	1,944	3,520	1.8
- Edgewood (ECO 2.8)	-31.1	241.5	241.5	1,669	3,139	1.9
Wall Insulation:						
- Edgewood (ECO 2.1)	----	241.5	241.5	241.5	8,82	
E1930 Plastic Wall	----	124.4	124.4	860	484	0.56
Install Thermostat and Control Valve in						
Bldg. 670 (ECO 2.2)	----	124.4	124.4	860	484	0.56
Upgrade Controls in						
Bldg. 393 (ECO 2.14)	----	78.0	78.0	539	399	0.74
Totals	-189.5	3,897.9	3,708.4	26,115	97,694	3.74
ECIP Criteria:	Cost > \$3,000 Payback < 4 years					

TABLE 1-5

QRIP PROJECT 1: MISCELLANEOUS LIGHTING PROJECTS

Opportunity	Annual Energy Savings			Unescalated		
	Electricity (MBTU)	Fuel Oil (MBTU)	Total (MBTU)	Annual Savings (\$)	Current Working Estimate (\$)	Simple Payback (Yrs)
reduce Lighting Levels:						
- Aberdeen (ECO 2.10)	24.12	---	24.12	104	216	2.1
- Edgewood (ECO 2.12)	71.70	---	71.70	309	518	1.7
Replace Incandescent with Fluorescent Light						
- Aberdeen (ECO 2.11)	71.70	---	71.70	744	1,031	1.4
- Edgewood (ECO 2.5)	19.8	---	19.8	205	285	1.4
Replace Standard Fluorescent with Energy-Saving Fluorescent						
- Aberdeen (ECO 2.12)	388.7	---	388.7	1,675	932	0.56
Replace Incandescent with HPS Lighting						
- Aberdeen (ECO 2-13)	65.63	---	65.63	283	1,630	5.8
	535.64	---	535.64	2,309	9,782	4.2
Install Light Motion Sensors in Bldg. 393						
	1,039.44	---	1,039.44	4,480	10,600	2.4
Totals	2,216.73	---	2,216.73	10,109	25,264	2.5
DTE/OMA QRIP Criteria: Cost < \$100,000 Payback < 2 years						

TABLE 1-6

LOCALLY FUNDED PROJECT - WALL INSULATION (CLAY WALL) FOR BUILDING E1930

<u>Opportunity</u>	<u>Annual Energy Savings</u>	<u>Electricity</u>	<u>Fuel Oil</u>	<u>Total</u>	<u>Annual savings (\$)</u>	<u>Unescalated Current Working Estimate (\$)</u>	<u>Simple Payback (Yrs)</u>	<u>SIR</u>
WALL INSULATION (CLAY WALL) BUILDING E1930	227.9	227.9	-----	227.9	1,575	13,526	8.60	1.93